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Notice of Allowability	Application No.	Applicant(s)	
	10/607,758	RYOU ET AL.	
	Examiner	Art Unit	
	Tuan N. Nguyen	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

- 1. ☒ This communication is responsive to 10/18/2005.
- 2. ☒ The allowed claim(s) is/are 1-3,5-9,12- 21, 24-27.
- 3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 - 1. ☐ Certified copies of the priority documents have been received.
 - 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

- 4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 - 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
- 6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date <u>12/15/05</u> . |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

DETAIL ACTION

Response to Amendment

1. In responding to applicant's amendment filed 10/18/2005, claims 5, 11, 27 have been amended, claims 4, 10 have been canceled.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below, to the amended claims 11, 20-27 should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Kevin W. Stinger (Attorney for Applicant, Reg. No. 48,959) on 12/15/2005.

11. **(Cancelled)**

20. **(Currently Amended)** A VCSEL comprising:
 - a substrate;
 - a first semiconductor mirror situated on said substrate;
 - an active region situated on said first semiconductor mirror;
 - a second semiconductor mirror situated on said active region;
 - a dielectric mirror situated on said second semiconductor mirror;
 - a first contact situated on said second semiconductor mirror; and

a metal interconnect connected to said ~~second~~ first contact and in contact with an edge of said dielectric mirror; and

wherein said dielectric mirror comprises thermally conductive material.

21. **(Currently Amended)** A VCSEL comprising:

a substrate;

a first mirror situated on said substrate;

an active region situated on said first mirror;

a second mirror situated on said active region; ~~and~~

a thermally conductive material in contact with an edge of said second mirror;

a contact thermally connected to said thermally conductive material; and

a thermally conductive layer that is thermally connected to said thermally conductive material and said second mirror.

22-23. **(Cancelled)**

24. **(Currently Amended)** The VCSEL of claim 21, ~~further comprising a~~

wherein the contact is situated on said second mirror.

25. **(Currently Amended)** The VCSEL of claim 24, ~~further comprising a~~

wherein said thermally conductive layer is situated on said second mirror.

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26. **(Currently Amended)** The VCSEL of claim 25, further comprising a second thermally conductive material situated on said second mirror and said contact.

27. **(Currently Amended)** A vertical cavity surface emitting laser, comprising:
a substrate;
a first mirror situated on said substrate;
an active region situated on said first mirror;
a second mirror situated on said active region;
a contact situated on said second mirror; and
a thermally conductive structure arranged for thermal communication with a ~~portion of at least one of:~~ the first mirror; and, the second mirror.

REASON FOR ALLOWANCE

Allowable Subject Matter

3. The following is an examiner's statement of reasons for allowance - Applicant's response filed on 10/18/2005 has been considered, with respect to claims 1, 11, 12, 20, 21, 27 the references of the record fail to teach or suggest:

Claims 1, 11, 12:

A VCSEL comprising a second mirror on a active region situate on the first mirror and substrate consecutively, where there is a first contact situated on a first portion of the second mirror, and a thermal conductive layer or a low thermal conductive layer situated on a second

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portion of the second mirror, wherein said thermally conductive layer or heat sink is thermally connected to said first contact.

Claim 20:

A VCSEL comprising a second mirror on a active region situate on the first mirror and substrate consecutively, where a dielectric mirror and a first contact situated on the second semiconductor mirror, where a metal interconnect between first contact and an edge of the dielectric mirror, wherein the dielectric mirror comprises thermally conductive material.

Claim 21:

A VCSEL comprising a second mirror on a active region situate on the first mirror and substrate consecutively, where thermally conductive material in contact with an edge of said second mirror; a contact thermally connected to said thermally conductive material; and

a thermally conductive layer that is thermally connected to said thermally conductive material and said second mirror.

Claim 27:

A VCSEL comprising a second mirror on a active region situate on the first mirror and substrate consecutively, having a contact situated on said second mirror; and a thermally conductive structure arranged for thermal communication with the first mirror and the second mirror.

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4. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Communication Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan N Nguyen whose telephone number is (571) 272-1948. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harvey Minsun can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tuan N. Nguyen

